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VOL. 307 113th YEAR LONDON, AUGUST 23, 1961 No. 5112 PRICE 1/6

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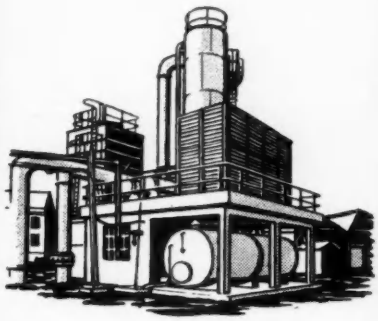

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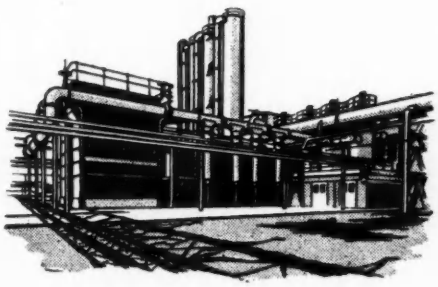

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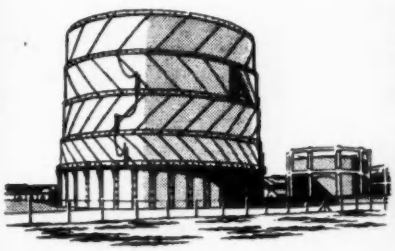

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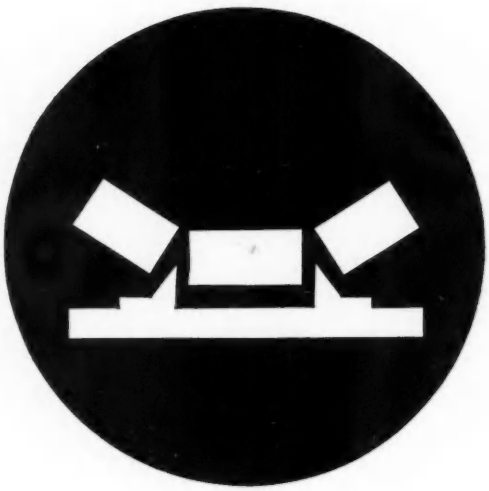

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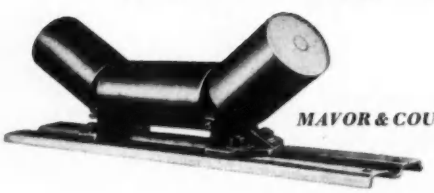

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Gas Journal

VOLUME 307 • NUMBER 5112 • 113th YEAR

WEDNESDAY, AUGUST 23, 1961

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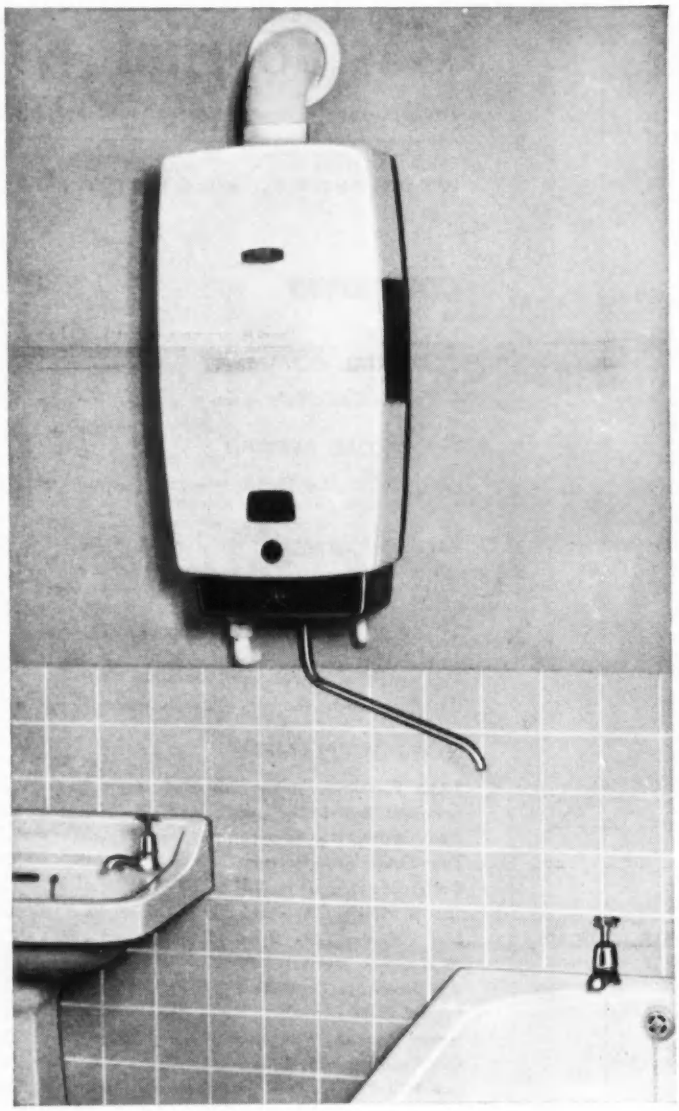
Editor:
GEOFFREY W. BATTISON

Assistant Editor:
WALTER F. TRUMAN

Technical Editor:
CHARLES J. P. DE WINTON
T.D., M.A., M.I.Gas E., M.Inst.F.

Publishers' Notice, See Page 353, May 31, 1961.



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The Select Committee's report

IT sometimes seems to us that the gas industry, perhaps more than most industries, tends to function between two opposing forces of opinion, one emanating from within the industry and one from without, both equally false. That within the industry tends to exaggerate its permanence and importance, indulging in a form of optimism which borders on wishful thinking, while that outside the industry is apt to write it off, anticipating its imminent demise. (The latter view has of course been expressed for the past 50 years). Needless to say, the true position lies between the two fields of opinion, but a balanced appraisal of the industry and its chances for the future only becomes possible on the comparatively rare occasions when a body such as the Select Committee on Nationalised Industries examines the situation with a dispassionate eye. Their report on the gas industry, published last week, appears to us to be a model of its kind, and while it contains much that is somewhat unpalatable to the industry, the gentle debunking of a few cherished but ill-founded beliefs will do us no harm. At the same time the Committee's acceptance of the potentialities of gas should do much to confound those who were a little too anxious to relegate us to the industrial museum.

The report is in six parts. The first is largely historical, describing the industry's achievement since vesting day and its present structure. Part II deals with financial results and capital investment, and Part III with the commercial position. In Part IV the present methods and costs of gas production are described, with particular reference to coke, choice of raw materials and research. But the essence of the report comes in the last two sections. Part V deals with future methods of production and the effect of these methods on the future structure of the industry. And lastly, the Committee give their general conclusions.

In the space of this brief comment it is not possible to deal adequately with the whole of the report; that will be left to a reviewer in a later issue. But we should like to examine some of the points made in the section on the position of gas in the fuel market, because it is on such matters that we sometimes tend to delude ourselves; and then to comment briefly on the suggestions made concerning the future structure of the industry.

The Committee do not consider the industry's competitive position to be very reassuring since, although sales have increased since 1950, resulting in a rise in the turnover of business from £232 mill. in 1950-51 to £389 mill. in 1959-60, 'its performance compares unfavourably with electricity and oil.' It is noted that, despite the decline in the consumption of house coal and coke 'in the period under review, gas did not appear to be moving into that part of the fuel market which coal and coke were vacating.'

Noting the industry's optimism about its future prospects, the Committee not unreasonably looked at earlier manifestations of optimism and discovered that the realisation tended to fall a good deal short of the expectation. In view of this one cannot blame the Committee for taking some of the industry's present hopes with a grain of salt—although, at risk of lapsing into just that optimistic never-never land of which we have been complaining, we feel bound to claim that, in some fields at least, gas has a great deal more chance of achieving its targets than at any time since nationalisation.

However, the Committee appear to be impressed by the potentialities of some of the industry's most modern appliances and developments in flues, etc., although it cannot be denied that up to now even the best results seem less notable when compared to sales increases for other fuels. In all this the Committee clearly appreciate the industry's difficulty in persuading the public that an industry 150 years old can produce a completely modern fuel. The report agrees that the image of gas cannot be changed overnight, but shares the belief that in the long term the improvements being made in the industry and its fuel will have their effect.

Without doubt the most interesting part of the report is that devoted to the future structure of the industry. Reference is made to the Gas Council's own suggestion that their powers should be increased to include the manufacture and supply of gas, the effect of the scheme being to give to the Council a coercive power on manufacture and transmission, leaving the boards responsible for the supply of gas to the consumers in their areas. It seems that the Ministry is unconvinced by this argument, believing that although there is a great need for more central planning, production of gas should not be divorced from its sale, and that the present structure is likely to be right for a long time to come.

The Committee point out that the Gas Council's proposals and the Ministry's comments on them raise two questions: Are the existing statutory powers enough to bring about the successful introduction of a national gas system; and if additional powers are needed should they be granted to the Council?

Their answer to the first part of the question is that the present set-up is not suitable for developing and establishing large-scale production and distribution facilities, due to the practical difficulty of getting a number of independent chairmen to fall in with the lead of a Council of limited powers. They conclude that while the existing statutory powers may in theory be adequate, in practice they are not so. They instance Lurgi as an example of the kind of investigation which has suffered from a lack of the drive which would be given by a single authority armed with powers and responsibility for developing gas production on a national scale. Rather different, they suggest, is the methane project in which the North Thames Gas Board, acting as the agent of the Gas Council, became the authority responsible for the development of the project and was able to bring the necessary drive to its realisation.

In answer to the second part of the question, the Committee consider that additional powers, if needed, must not necessarily be given to the Gas Council. The Committee enumerate the three possibilities which are open to Parliament if it should wish to legislate anew for the industry in the future. The first possibility, and the one favoured by the Ministry, is that the present structure could be left unchanged 'in the hope that the spirit of collective co-operation which the board chairmen have shown in their attitude to the methane project should extend to other problems on a national scale.' The second possibility, preferred by the Gas Council, is that they should be given powers to manufacture and supply gas. And the third possibility envisages the setting up of a thirteenth board to undertake gas generation on a large scale and to control such aspects of national gas supply as a national grid and underground storage. This last is the course of action favoured by the Committee.

The thirteenth board

The conception of a thirteenth board, which would be somewhat analogous to the position of the Central Electricity Generating Board and the Electricity Council—except that, for a while anyway, area gas boards would continue to operate such of the existing gas-making plants as were needed—is an interesting one. It would have the advantage of giving the new board a single purpose, untrammelled by the many and varied responsibilities of a gas board charged not only with making but selling and servicing, and, as the Committee puts it, 'the Gas Council would retain their impartiality and disinterestedness in any conflict between large-scale production and area board production, and so would not lose their present characteristic objectivity.'

Whichever course may be taken, the Committee stress that the predominating factor is that of time. Because the new, large-scale processes are still embyronic there is a temptation to take no decision on structure yet awhile, but the Committee point out that if nothing is done, when the processes are proved the organisation will not be there to make the most of them, and unless the organisation is changed the processes may not come forward as quickly as they should.

There is one other aspect of this, in our view admirably lucid and balanced report, which should be mentioned, although detailed discussion of its implications must wait until another occasion. This is the Committee's concern at Ministerial interference with gas boards' decisions regarding various matters, notably price changes. It is recommended that a written statement of any Ministerial intervention on tariffs should be laid before Parliament at the time it is made, and that as soon as possible an amending Gas Bill should be introduced, giving the Minister the necessary statutory power relating to tariffs.

The Committee add that in their opinion the clear division of responsibility between the Minister and the board of a nationalised industry should normally be defined by statute, that the changes in this division of responsibility should be made by statute, and that when the Minister intervenes Parliament should be informed at once.

The need to compete

In their conclusions the Committee, accepting the fact that the first phase of the life of the nationalised industry is nearly complete, emphasise the industry's need to compete. They are in no doubt that in the domestic, industrial and commercial market there will be a place for gas for many years, but the size of the market will depend on the price of gas. New processes need to cost at least 4d. a therm less than the cost of making gas in a carbonising plant. 'This reduction of about 30% in costs must be made quickly and on a large enough scale to make an early effect on the average national price of gas.' They comment that the Gas Council's expenditure on research has been 'slow, quick, slow, quick' (which seems unlikely to have even Victor Sylvester's blessing), and maintain that even now expenditure on research is too low in relation to the industry's annual turnover. 'In this industry,' they remark, 'the rôle of research is vital.'

It is suggested that some area boards may still be able to get some important reduction in overall cost by adopting more processes that use oil, 'but the best chance of achieving a substantial reduction in cost in all the boards appears to lie in large scale production on a national basis backed by a national grid and helped by underground storage.'

It would seem to be the examination of the two schemes for immediate development, methane and Lurgi, and more particularly the sense of urgency attaching to the investigation of the latter, which influenced the Committee in their consideration of the structure of the gas industry and their conclusion that the introduction of a thirteenth board offered the best chance of success.

As we suggested at the outset, the application of the industry to an objective eye—26 objective eyes to be precise—will do us nothing but good, since the analytical approach has been tempered both by sympathetic understanding and by constructive imagination. If the report spurs us on to greater efforts, and at the same time introduces timely changes in legislation, our debt to Sir Toby Low and his Committee will be considerable.

From a paper read to the London and Southern Section of the I.G.E.

Reduction of the carbon monoxide content of town gas

By K. W. FRANCOMBE, M.I.GAS E., M.Inst.F.,
WHESSOE LTD., DARLINGTON.

WHILE the pre-war detoxification plants in Germany[1] did not excite a great deal of interest in this country, the recent installations in Switzerland (notably Basle[2]) have certainly done so. The Gas Council has advocated that all new gasification plants should produce town gas with a low CO content (preferably less than 5%) and the new Lurgi high pressure coal gasification systems at Westfield (Sc.G.B.)[3] and Coleshill (W.M.G.B.)[4], and the stage 2 Shell high pressure oil gasification system at the Isle of Grain (S.E.G.B.)[5] all include a CO conversion stage.

The last figures published by the Gas Council[6] indicate that of 2,821 mill. therms of gas provided from all sources, 61.2% was coal gas, 14.3% water gas, 3.6% mainly oil gas, and 20.9% was coke oven and refinery gas purchased from outside the gas industry. Even with the three new h.p. gasification plants in full operation, some 70% of town gas will still be derived from carbonising and water gas plants much of which will contain between 15% and 30% of CO.

The greatest need

The problem is least acute for those boards which make large purchases of coke oven gas which may contain only about 7.5% of CO. Such purchases by three of the 12 area boards range from 57% to 80% of the total gas available to those boards[6]. The need for CO reduction is greatest, however, with those boards relying mainly on c.v.r. gas and c.w.g. for town supply, the CO content of which may reach or sometimes exceed 20% during peak load periods.

The CO reduction system could be applied to existing sources of town gas supply provided that:

1. The cost of the operation is relatively low; the total cost including capital charges should be less than say 1d. per therm for such component gases as may be processed, so that the increased cost of the town gas is below this figure.

2. The operation of the system will be trouble-free; this applies particularly to the life of the catalyst.

It would seem likely that the classical water gas shift reaction will continue to form the basis of most town gas CO reduction plants.

$$CO + H_2O \rightleftharpoons CO_2 + H_2 \quad \triangle H_{673} = -9{,}115 \text{ cals.}$$

Of widespread application in the production of ammonia synthesis gas from coke, and from reformed gaseous hydrocarbons, it is immediately applicable to b.w.g., but this gas is not produced in significant quantities in the gas industry. It is its application to unsaturated hydro-carbons—particularly the diolefins which especially in the presence of nitric oxide and oxygen are potential gum formers—present in coal and water gas, which is new.

This reaction forms the basis of the three high pressure and the single low pressure CO conversion systems at present in operation or in course of construction in this country, and also of the Basle detoxification plant in Switzerland.

Other possible methods of CO reduction[7,10] include methanation and absorption in cuprous solutions, none of which, however, seems so immediately applicable as the shift reaction.

When CO is converted to H_2 and CO_2, the c.v. of the reacted gases is reduced in proportion to their volumetric increase without significant reduction in their total thermal value and with a small change in their density.

Since the c.v. of CO and H_2 are almost identical, there is no obvious thermal loss. The reaction is exothermic but the resultant heat may be regarded as largely the latent heat of the water-vapour used in the reaction—partly in the form of low pressure steam and partly by the evaporation of water using the heat of the reaction—without loss of gross c.v.

There is a volumetric increase in the converted gas because for each volume of CO converted one volume of CO_2 and one volume of H_2 is produced. Thus the c.v. of the product gas is correspondingly reduced although its total thermal value remains practically unchanged. There is only a small change in the density of the reacted gas, since one gram-molecule of CO weighing 28 grams produces two gram-molecules occupying double the volume and weighing 46 grams total, or an average of 23, *i.e.* a slight reduction in density of the gases resulting from the reaction.

Two typical cases

It will be worth citing two typical cases to exemplify these effects. If c.w.g. (enriched by p.f.d.) of 503 B.t.u. per cu.ft. gross c.v., and sp. gr. .54, containing 24.3% CO and .3% O_2 is treated to reduce the CO content to 4.2%, the product gas will be 118.4% v/v of the original gas, the c.v. will be reduced to 424 B.t.u. per cu.ft. and the sp. gr. will change to .555. Corresponding figures for c.v.r. gas might be 475-B.t.u. per cu.ft. gross c.v. .48 sp. gr., with 18% CO and 0.4% O_2, converted to 111.8% v/v of product gas containing 4.5% CO, with a c.v. 424 B.t.u. gross per cu.ft. and 0.50 sp. gr.

The crux of the problem is of course to restore the c.v. with least change in the sp. gr. of the gas and hence of its Wobbe number. This can only be done with precision by both CO_2 extraction and enrichment. But this is likely to prove a counsel of perfection and must usually be ruled out on economic grounds. If it is a matter of choice between these alternatives, then enrichment is not only by far the more economical solution, but it also produces the least change in sp. gr.[7]

With c.w.g. (gas oil) of 503 B.t.u. per cu.ft. gross c.v. after CO reduction to 3.9% and 4.2% butane enrichment, the sp. gr. changes only from .650 to .692 and the Wobbe number from 624 to 601, whereas after 78% CO_2 removal without enrichment, the sp. gr. changes to .470 and the Wobbe number to 730, although in the latter case the CO is reduced only to 8.3%. Thus butane enrichment produces the smaller change (of only 23 in the Wobbe number), and if this converted c.w.g. were present to the extent of 33% v/v in town gas, there would be a change of only 8 in the Wobbe number of the town gas, compared with town gas containing 33% v/v of unconverted c.w.g. There is a far greater alteration in Wobbe number when changing from gas oil enrichment (Wobbe 624) to p.f.d. (Wobbe 684), and that indeed after CO conversion of c.w.g. (p.f.d.) to 4.1% CO, 3.2% butane enrichment and no CO_2 removal, the Wobbe number of 650 is nearer that of the original c.w.g. (gas oil) (624) than if CO conversion were not practised (684).

Butane enrichment

These arguments admittedly concern the change in Wobbe number rather than the direction of the change, but the fact remains that butane enrichment following conversion from gas oil to p.f.d. enrichment and subsequent CO reduction, still produces a lower gravity gas (.593) than that previously obtained with gas oil (.650).

Methane—arbitrarily considered as having a c.v. of 1,000 B.t.u. per cu.ft. and a sp. gr. of .55 (butane 3,300 and 2.0)—would have the effect of raising the sp. gr. of the gas even less than butane when enriching to any given c.v. c.w.g. (p.f.d.) is found to change from sp. gr. .54 (Wobbe 684) to sp. gr. 593 (Wobbe 650) after 3.2% butane enrichment to the required c.v. If 17.5% methane enrichment were practised, the sp. gr. would become .554 (Wobbe 670) —a very small change indeed.

In practice it may prove possible initially to enrich c.w.g. with p.f.d. to a greater degree than obtained before CO conversion, and thus largely or completely to avoid the necessity of cold enrichment, with some saving in cost. Thus the low pressure conversion plant previously referred to will treat c.w.g. (p.f.d.-enriched) to 570 B.t.u. per cu.ft., which after CO conversion will be reduced to 475 B.t.u. per cu.ft. the required figure. If however c.w.g. were required at 500 B.t.u. per cu.ft., it is unlikely that initial enrichment to 600 B.t.u. per cu.ft. or above would be possible, since the p.f.d. would be incompletely cracked and condensation of hydrocarbons would follow. In these circumstances the solution would be some additional hot enrichment with p.f.d., and a smaller addition of butane (or methane) than would otherwise be necessary.

Reformed refinery gases

Dealing next with reformed refinery gases (tail gases and l.p.g.) and also methane, the CO content will depend on the gases which are reformed, the type of reformer, *e.g.*, whether cyclic or continuous, and on the extent to which it is operated autothermically by the admission of air with the steam. For example the Power Gas—Hercules continuous catalytic reformer operated partly autothermically on natural gas, at the Whitby works of the N.E.G.B., is stated[12] as providing a final town gas with a CO content of 7.4% which will obviously be an acceptable figure for many years to come.

On the other hand the lean gas reformed from refinery tail gases and/or virgin naphtha using both c.w.g. plant with fuel bed reforming and the H. & G. cyclic Onia-Gegi system, at the Southampton works of the S.G.B., is reported by Haffner[13] as having CO contents ranging from 11 to 26.5% CO according to the feed stock and the particular reformer used. The highest CO contents are produced in the c.w.g. plants when using virgin naphtha for fuel bed reforming and carburetting.

The corresponding figures for the H. & G. Onia-Gegi plant at Romford (N.T.G.B.) operated on refinery gas are given by Burns and Stewart[14] as ranging from 12.6% to 18.0% CO, before enrichment. The Simon Carves Otto continuous catalytic reforming plant at Guernsey is reported[15] as producing gas with a CO content of between about 21% and 25% before final butane enrichment.

After c.w.g. and reformed petroleum products, the gas which will usually receive next consideration is that produced in c.v.r. especially when heavily steamed. A typical 475-B.t.u. per cu.ft. gas may contain around 18% CO and hence require CO reduction. Indeed Currier[16] has advanced reasons for this gas receiving priority consideration, mainly on account of its higher load factor.

It may be shown that if a typical 475-B.t.u. per cu.ft. gas containing 18% CO is reduced to 4.4% CO, without CO_2 removal, but with subsequent cold enrichment with 2% butane, the sp. gr. will be raised from .48 to .527 and the Wobbe number will drop from 686 to 654. If 11% methane were available for enrichment the increase in sp. gr. would be only to .505 and the drop in the Wobbe number will only be to 670. It should usually be possible to accommodate these relatively small changes without seriously adverse effect on the function of gas appliances bearing in mind that the Watson House definition of the gas groups implies that an appliance will operate satisfactorily over the whole range of Wobbe numbers in a given group. (The average tolerance of numbers allowable in each of Groups 4 to 7 inclusive, is ±29).

Other governing factors

Admittedly there are other factors—notably the flame speed factor[19]—governing the combustion characteristics and hence the interchangeability of gases. The CO_2 content of converted c.w.g. might reach 25% but as it has never been proposed to distribute such gas neat, but probably at most as a 40/60 mixture with coal gas, itself containing up to 15% CO_2 after CO reduction, the town gas is never likely to exceed 20% CO_2, which is the figure quoted by the Watson House Centre[17] as tolerable for combustion. Morley and Marianvalle[18] have demonstrated that such CO_2 contents are unlikely to give rise to corrosion troubles.

Priestley[8] has also worked out a large number of examples to show that typical Group 4-7 gases may be converted to contain less than 5% CO and give a product gas which after cold enrichment with butane or methane for the restoration of c.v., and without CO_2 removal, will have a Wobbe number which will ensure its retention in its original gas group and furthermore which will conform with both Weaver's and Gilbert and Prigg's criteria[19] for interchangeable combustion characteristics. More recently these arguments have been substantiated by Andrew[17].

A case then has been made out for the treatment of the more toxic components of town gas for the reduction of their CO contents to below 5% and not for the complete removal of CO from town gas, which would be a more costly and complex operation; its consideration must be postponed until some future date. The question is whether the industry can afford to treat a part of its gas in the manner described bearing in mind the sales advantages of supplying a gas of reduced toxicity and of reduced organic sulphur content.

Taking first c.w.g., it is generally accepted that the use of p.f.d. for its enrichment (and sometimes also for fuel bed reforming) has reduced the cost of c.w.g. by

between 1d. and 2d. a therm in comparison with gas oil enrichment. This is on account of the lower cost of the feedstock and the higher outputs obtainable from the plant. This saving will considerably exceed the cost of CO reduction but is not of course in any way tied to it.

If c.w.g. is treated for CO reduction without subsequent CO_2 removal, and is followed by commercial butane enrichment, there will be a volumetric increase in output of between 20% and 30% at the cost of the 3% or 4% butane added. As the cost of butane will usually be well below the cost of the gas into holder, this additional gas will be provided at an extremely competitive price level.

If it can in fact be used without restricting other sources of supply, the saving which accrues, would normally just about cancel the cost of CO reduction. If methane were available at say 6d. a therm there should be a profit on the operation of a CO reduction plant incidentally employed as a means of additional gas production.

Final gas costs

Taking for example c.w.g. (p.f.d.) which has undergone CO reduction and methane enrichment to the extent of 17.5%, 100 cu.ft. of this gas costing say 1s. a therm into holders, plus say ¼d. a therm for its CO reduction, produces 135.9 cu.ft. of final gas, of which 18.4 cu.ft. is 'free' CO_2 produced in the reaction and 17.5 cu.ft. is cold enrichment methane costing say 6d. a therm. On this basis the final gas thus costs 11d. a therm, so there is 1d. a therm profit on the larger volume of gas available. The corresponding figures for enrichment with butane costing 9d. a therm, are 121.6 cu.ft. of final gas costing 12.1d. a therm, *i.e.*, CO reduction has been carried out at a net cost of .1d. a therm.

Similar considerations, if in lesser degree, apply to c.v.r. gas. The reduction of CO from 18% to 4.4% gives rise to a concurrent increase in CO_2 production of 13%, less say 1.2% for H_2/O_2 combustion, plus 2% butane addition—a net increase of 13.8% for the cost of the 2% butane addition. This will go a long way towards completely offsetting the cost of the operation which on the above basis amounts to .3d. a therm. If 11% of methane were used instead of butane, the net increase in gas production would be 22.8% and the operation would show a profit of about .5d. a therm.

Coke causes concern

In some (but not all) areas mounting coke stocks are a cause of concern. The value of these stocks is credited against the cost of gas production, but should they become unsaleable at current marketing prices, a heavy loss would be incurred in their disposal. Where there is adequate c.w.g. plant capacity available, more of these stocks might be gasified were it not for the arbitrary limits sometimes set on the proportion of c.w.g. which may be present in town gas on account of its toxicity.

In these circumstances a CO reduction plant would allow of an increased proportion of c.w.g. being used without increasing, or if desired while actually reducing, the CO content of the town gas. The operation of a part of the c.w.g. plant as a base load producer would avoid some of the heavy costs of stocking and reclaiming coke with the accompanying degradation which occurs. Hawthorn has outlined[9,16] the savings which may thereby be secured.

A most useful bonus arising from CO reduction is the concurrent reduction of the organic sulphur content of the gas which is treated. The major part of this sulphur is converted to H_2S by hydrogenation in the shift reactor at comparable efficiency to that obtaining with a catalytic organic sulphur removal system. This bonus does not amount to a great deal when treating c.w.g., since the organic sulphur content usually amounts to only 10 or 12 grains per 100 cu.ft. and there will usually be 3 or 4 grains slip of the resistant thiophen.

But if c.v.r. gas containing perhaps 25 or more grains of organic sulphur is treated, the effect is considerable and the combined cost of CO and sulphur reduction does not appreciably exceed the usual cost of organic sulphur removal alone, quoted by Clark and Spivey[21] as ranging from .2 to .8d. a therm.

The costs of a typical CO reduction project are shown in table 1.

TABLE

Cost of CO reduction excluding subsequent H_2S removal

Item	Cost ; d. per therm
Capital charges @ 10% p.a.	.292
Catalyst renewals (2 years' life basis)	.093
Power @1¼d./KWH	.099
Low pressure steam @ 4s. 6d./1,000 lb.	.080
Hydrogen loss, say 1% @ 1s. 0d./therm	.077
Quench and saturator water (treated) @ 2s. 3d./1,000 gal.	.009
Cooling tower recircd. water @ a total cost of 5d./1,000 gal.	.018
TOTAL COST/THERM (FEED GAS)	.668

The capital charges are by far the largest single item in the cost per therm of CO reduction. It follows that a fairly large plant operating at a high load factor should be installed. C.w.g. most often employed as a peak-load gas will have an inherently poor load factor although it may sometimes be worth while operating a CO reduction plant with a section of a large c.w.g. plant which may be operated on a high load factor, bypassing the remaining c.w.g.

A better solution would be to install a plant of capacity approaching that of the c.w.g. plant peak production and when the output is reduced, to make good the deficit to the CO conversion plant with c.v.r. gas, thus enabling the conversion plant to be fully employed. In such cases the choice of the catalyst, will be more restricted since the higher nitric oxide content of the c.v.r. gas coupled with the higher unsaturated hydrocarbons content of the c.w.g.

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will enhance the tendency towards gum formation and deposition on the catalyst.

Alternatively a guard catalyst might be employed, in which connection it will be recalled that the original conception of one of the organic sulphur removal catalysts (nickel sub-sulphide) was that it would effect nitric oxide removal to avoid gum formation on the district[22] before water-sealed holders were operated in a manner to avoid this trouble. Hence such catalysts may be employed to protect the main catalyst if the latter is vulnerable in this respect[7].

If it is preferred to treat c.v.r. gas alone, consideration should be given to the installation of a converter plant of capacity somewhat below the peak maximum gas output, by-passing the surplus gas for the short periods involved.

DISCUSSION

Mr. G. U. Hopton, Research Director, Watson House, referring to the practice of removal of carbon monoxide on the Continent, said that at Munich the gas was reformed natural gas, and so the constituents would not foul the catalyst. By following the cracking plant by the shift plant, all undecomposed steam and superheat in the gas would be usefully employed. Costs were estimated at ¼d. per therm. In the Deringer process, proposed for Winterthur, however, the carbon monoxide would be absorbed in an aqueous slurry of cuprous and magnesium chlorides, and oxygen removal was believed to be needed before treatment. The plant required special materials and had a high power demand for gasifying solutions under vacuum. Gas yield was reduced and the carbon monoxide had to be burnt.

The process cost 2d. a therm. In the shift treatment of c.w.g. butadiene and cyclopentadiene caused slow cumulative poisoning of the shift catalyst and acetylene led to rapid fouling, but the catalyst recovered when acetylene free gas passed through it. Organic sulphur compounds reduced the activity of the catalyst.

Only a trial under full scale conditions would show the cost of rapid changes of catalyst, so it might be impossible to run without a guard for the catalyst until this was known. A pilot plant with four streams each with 1 cu.ft. of catalyst would shortly go to work at Beckton. One would be unguarded, while each of the others would be protected by nickel subsulphide, nickel molybdate and iron oxide respectively.

All four would treat c.w.g. made from light distillate. Tests would also be carried out on regenerating the catalyst. Tests were also being carried out on the removal of carbon dioxide after shifting, by potassium carbonate with and without additives—glycine and arsenious oxide—and also with ammonium carbonate. With the latter though first thought promising on estimated costs, showed a marked decrease in the mass transfer coefficient with increase in partial pressure of CO_2. Present estimates were 1d. per therm for its removal from shifted gas.

Referring to Mr. Francombe's having pointed out that the cost of shifting could be offset by enrichment with butane or methane, he said that the Wobbe number could be controlled at its winter value throughout the year by enriching with butane, not only to restore the c.v. but to increase it beyond the declared value. This had three advantages: (a) An increase in output, (b) low carbon monoxide, (c) increased scope for offsetting the cost of CO removal by using cheap butane.

Mr. Francombe replied that he considered that redeclaring the calorific value of the gas was a very good idea indeed. Referring to using carbon dioxide as a vehicle for the enricher, he said that up to 20% of carbon dioxide could be tolerated in town gas, even with moist gas. Using reformed gas such as was produced at Munich, if it was free from sulphur and could be run through the carbon monoxide convertor as hot wet gas, it would reduce steam costs. At Munich the gas came straight from the wash box at a temperature of 165°F., and so saved .1d. per therm on steam consumption.

Mr. J. A. Prigg, Watson House, said that Mr. Francombe's rather grudging admission that there might be something other than Wobbe number to consider in combustion characteristics, might lead to two kinds of error, one of which was that the gas would have more tendency to lift or to ignite more easily than was expected, and the other was that of costs.

In considering the combustion characteristics of the converted gas, it was important to know the type of gas from which one was starting. Gas containing 20% carbon dioxide was only tolerable under certain conditions. These conditions might not often arise but they must continuously be borne in mind. A converted gas from one low in hydrogen or high in inerts, might well be unacceptable with a high CO_2 content, but in any case the amount of butane/air or butane/inerts that could be added to the converted gas would be reduced.

Mr. Francombe had shown that a profit could actually be made on carbon monoxide conversion by using the cheaper hydrocarbon therms for enrichment. These might be used, however, if they had been available without conversion simply by adding hydrocarbon/air or inerts to the gas. On Mr. Francombe's basis of costs, the profit margin might be increased still further by increasing the calorific value of the converted gas by about 25 B.t.u. per cu.ft. and re-declaring, so the loss in Wobbe number could be recovered arising from the conversion.

A peculiarity of the converted gas was the absence of oxygen, and since difficulties causing the blockage of pilots by a more ready cracking of the gas had been reported with gases without oxygen from underground storage and catalytic sulphur removal, he asked whether Mr. Francombe had any information on this point.

Mr. Francombe replied that he had not come across any examples of gas breaking down in pilot flames. When they reduced the carbon monoxide content, they hoped the gas would be good enough. It would be quite feasible to have a higher declared calorific value if the Wobbe number was right.

Mr. Newling, N.T.G.B., said that he thought the boards' costs had been underestimated. A figure of 1d. per 200 cu.ft. would be nearer the mark.

The extra gas from the shift reaction was in the form of carbon dioxide, and the inert gases were equal in volume and weight to the steam converted; since it was the only diluent gas of low carbon monoxide content that was available, this was something to exploit. The close control of the Wobbe number was important.

When taking the winter value, and shifting and enriching, it only moved from one side of the group to the other. Shifting should be combined with a modest rise in the calorific value, since by so doing the shifted c.w.g. was still on the map as far as the Wobbe number was concerned. With more than 30% extra thermal output, this was nearly as much with inert gas or air.

There was scope for a major improvement in quality, with low carbon monoxide content, low sulphur content, and a constant Wobbe number. A modest increase of ¼d. seemed to be justified, so progress rested on technical feasibilities, and a knowledge of the operating conditions to work all the year round was needed. There was also scope for coal gas. At Basle it could be treated if the shift catalyst was given the double protection of the residual benzole and a guard catalyst. Details of neither of these

were fully known in this country. They needed to know the quantity of the benzole remaining in the gas before shifting.

Mr. G. H. W. Madge, N.T.G.B., said that they had been aware on the utilisation side of a rise in the carbon monoxide content. With the increasing age of the population and the increasing use of gas, it was becoming more difficult to protect domestic consumers without a large reduction in the carbon monoxide content of the gas. If costs of alternative methods of protection had to be borne by the boards, they would find it was greater than the cost of removing carbon monoxide.

There was increasing public interest in the subject, and there was no question that something must be done about it. They should take advantage of the cheap enriching gases now available, and reduce the price of gas with the removal of the carbon monoxide, otherwise when public conscience made them remove it, up would go the price. When this problem had been solved, gas could truly claim to be a refined fuel, and a far superior product to any other to meet the expanding heating load in the home.

Mr. A. F. Grant, N.T.G.B., Kensal Green, suggested full-scale trials with the conversion plant following the benzole plant, but there would need to be a cheap form of H_2S extraction plant in front of the benzole plant. The final purifier plant might be a modified form of the Appleby-Frodingham system. It was difficult to find a wet purification system which showed any real reduction in processing costs

Mr. Francombe referring to a plant, the details of which he was unwilling to divulge, replied that with 8 grains of H_2S per 100 cu.ft. in the gas to the final purifiers, normal oxide boxes a fraction of the size needed for a works of equal capacity, would purify down to Referees' standards, with an oxide life up to 10 years. Every time a new purification system was investigated, it generally appeared to be more expensive than boxes or towers. He considered the Appleby-Frodingham process a little too complicated for this task.

Mr. J. T. Veryard, S.E.G.B Croydon, referring to underground storage, pointed out that organic sulphur compounds might be converted to hydrogen sulphide during storage, necessitating their removal. He compared the removal of carbon monoxide to that of carbon disulphide by the old South Metropolitan Gas Company. The secondary purifiers in that case had worked a whole year without attention.

Carbon monoxide in stored gas was likely to form carbonyls, and for this reason at a works south of Paris, Gaz de France removed any trace of them with activated carbon. He did not consider it feasible economically to reduce the carbon monoxide content to such a low figure that carbonyls were not formed, but the French industry purified their town gas both before it entered the underground storage and when it was withdrawn, using activated carbon in both cases. It gave satisfactory results.

Proposing a vote of thanks **Mr. L. J. Clark,** Assistant Chief Engineer, N.T.G.B., said that never in an established industry had there been so much change and technical development, or so much brain power available, and spirit of enquiry needed. Every new process in the gas industry brought its own problems.

No one liked legislation and that relating to sulphur removal was unnecessarily stringent, but the industry must put its own house in order before pressure was brought to bear on it.

More information was needed on carbon monoxide removal. There was a good case for leaving carbon dioxide in the detoxified gas in most cases, though during times of peak demand, it should be taken out and replaced by more butane/air or methane/air.

Carbon monoxide and organic sulphur could be removed in a combined operation at the same cost. This was important because of the difficulties of the benzole market. At Basle the gas was comprehensively cleaned up before distribution.

Exciting times were ahead for the gas industry and a multiplicity of processes were coming to hand. High pressure processes assisted CO_2 removal. Load factor was important, and when this was at its peak a high proportion of CO_2 should be removed and other gases added. At other times the proportion should be reduced. As new processes were developed the removal of carbon monoxide should be developed.

Gas production by the Dutch State Mines

OF the overall gas production by the Dutch Staatsmijnen of about 22 bill. (10^{12}) B.t.u. in 1960, about 80% was coke oven gas and the remainder gas from coke and methane drained from the collieries. About 30% of the output was sold to municipalities and industries in the area supplied by Staatsmijnen. Gas sales through the gas distribution service rose by 9% in 1960, i.e., from 5.6 bill. (10^{12}) B.t.u. in 1959 to 6.1 bill. (10^{12}) B.t.u. in 1960. Of the total volume of gas used in the whole of the Dutch public supply in 1960 of about 25 bill. (10^{12}) B.t.u., the Staatsmijnen contributed nearly 25%.

Sales to municipalities increased by 7%, while increased industrial activity in the Netherlands manifested itself in the amounts sold to those industries directly connected to the Staatsmijnen grid, deliveries to consumers in this category going up by as much as 15%.

A comparison between the total sales in 1960 and over the previous three years is shown in the table.

Year	Sales ($\times 10^{12}$ B.t.u.) Municipalities	Industries	Total
1957	3.6	1.8	5.4
1958	3.8	1.7	5.5
1959	3.9	1.7	5.6
1960	4.2	1.9	6.1

Of the remainder of over 14.4 bill. (10^{12}) B.t.u. about 60% was used as fuel gas in Staatsmijnen's own industry, especially in the coke ovens, while the other 40% (equivalent to about 6.5 bill. (10^{12}) B.t.u.) were used for the production of chemicals, especially nitrogen fertilisers.

In 1961, the amount of gas processed into plastics will be increased by the use of cracker gases recovered from light gasoline.

To meet the increasing demand for coke oven gas by the gas distribution service during the winter months Staatsmijnen make gases suitable for heating the battery to release coke oven gas. Other basic materials are also used with coke oven gas in ammonia synthesis. Two producer gas plants are in operation at the Maurits coking plant, while the Emma plant also has a separate installation for the production of fuel gas.

Here, coke is gasified with the use of an oxygen-steam mixture as the gasifying agent. The temperatures reached in this process are very high so that the coke slag can be discharged in a molten state.

The gas produced in this installation 'oxygas' has a high calorific value and is fired in those batteries that have not been designed for heating with producer gas.

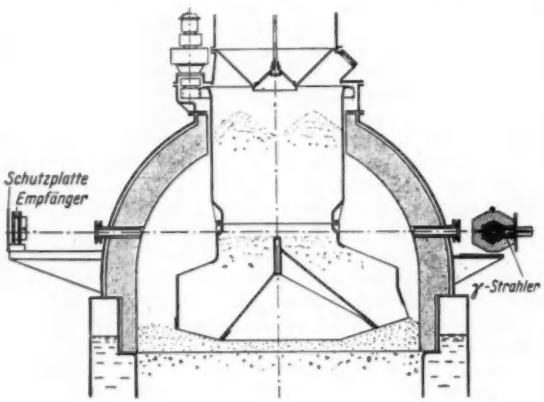
GAS generators using solid fuel and equipped with automatic hopper-type feeders are not new. In the continued drive to lessen the attendance and improve their operation, better methods for their control have been proposed. One of the most important aspects of the control system was the maintenance of the correct fuel level in the supply hopper.

This has been previously sensed by various mechanical devices which, when the minimum coke level was reached, initiated the reloading operation. Owing to the arduous operating conditions, heat, and dust in particular in units with rotating fuel distributor systems, these sensor devices have often proved unreliable. Direct timer control of the reloading operation has proved unsatisfactory because of its lack of flexibility.

A new approach to the problem, which promises to avoid the previous difficulties, uses radioactive isotopes and a Geiger-Müller counter tube as shown in the diagram.

The radio-active cobalt is mounted in a lead-lined cast-iron housing provided with a collimator directing the gamma radiation at the counter tube.

As soon as the coke level falls below the gamma ray beam, *i.e.*, the minimum level, the counter tube, by receiving a larger signal, initiates the reloading operation through an amplifier and relays.



Schutzplatte = *Shield plate*
Empfänger = *Counter tube*
γ-Strahler = *Gamma Emitter*

The shielding around the radio-active source permits free access in the vicinity and the source itself is mounted on an eccentric inside the shielding so that the simple turning of a knob on the shielded vessel moves the source to the storage position, precluding any leakage of radiation during maintenance.

The life of the gamma source is long and hence the cost thereof is low. The device is simple and has proved itself reliable in service.—*H. Lorrek, Das Gas-und Wasserfach*, March 3, 1961, **102,** 215.

GAS plants producing a mixture of hydrocarbon gases and air have been used both in localised networks and for peak-load plant for some years. This article surveys generally those in operation in Holland. These units are required to produce a constant mixture such that the calorific value divided by the square root of the density remains constant and hence the pipe capacities and meter readings are unaffected by the addition of the gas. To make propane equivalent to normal town gas, we must add approximately 71 parts of air to 29 parts of propane.

In order to avoid corrosion with this considerable percentage of free oxygen it is essential to keep the moisture content of the gas low, for example, by drying and by covering the water seal in the gasholder with a layer of oil.

In Holland, tetrahydrothiophen is used to give the identifying smell and this can be conveniently added in a device similar to a motor carburettor.

The propane is usually stored in horizontal cylindrical vessels at some 15 atmospheres pressure. The vessels are mounted above ground and painted black to assist evaporation except for the top, which is usually painted with aluminium to avoid excessive sunlight heating. The usual safety valves, and other fittings, are standardised as specified by the relevant codes.

Two basic principles of controlled mixing are recognised in Holland, injection and direct volume control, in either case the plant operates fully automatically. A schematic drawing of a plant operating on the second principle is shown in the illustration.

★ Automatic control of gas generator feeders by gamma radiation

★ Propane—air plant experience

★ Prevention of internal corrosion in gas lines

As can be seen, the propane flow is controlled primarily by a signal from the town gas flow along the top pipe in the diagram. The pressure of propane before the measuring orifice and control valve is maintained constant by the pressure reducing valve (2).

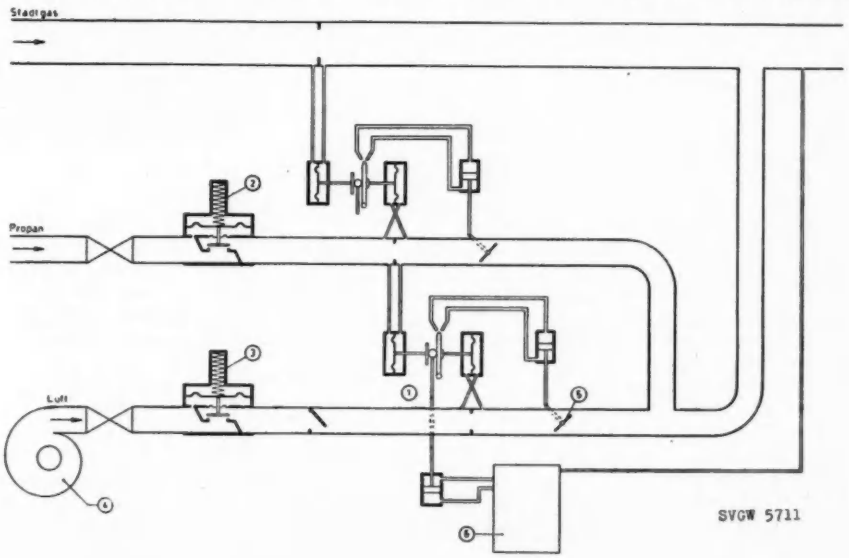
The propane flow can be controlled between 20% and 100% of the plant capacity or as a percentage of the main town-gas flow. The air is supplied by a blower (4) through a pressure control valve (3) and a non-return valve.

The air flow is controlled by a volume controller acting through the butterfly valve (5).

The relative quantities of propane and air can be adjusted at will by a knob on the volume controller. As stated above, provided the air quantity is set to suit the calorific value of the hydrocarbon, no alteration is required to the pipeline equipment to cater for the added gas.

It is usually necessary to alter the burners used by the consumers since these hydrocarbons burn much more slowly than does town gas.

This article gives sketches of different types of burners for single and dual fuel use.—*G. Gaikhorst. Monatsbulletin, Schweiz. Verein von Gas-und Wasserfachmännern*, No. 2, **41**, 29.



Stadtgas = *Town gas*
Propan = *Propane*
Luft = *Air*

LITTLE consideration has been given in recent decades to internal corrosion compared with external corrosion of gas lines. Internal corrosion is always present with its indirect effect, dust. The results, however, are not serious with low-pressure networks, and penetration of the pipe wall is very rare.

External corrosion has been more frequent in recent years. Internal corrosion, as needs no explanation, is caused mainly by dampness and acids as well as hydrogen cyanide and hydrogen sulphide.

It has been noted that where the outside temperature causes appreciable condensation and hence there is a considerable flow of water to the seal pots, the pipe walls are protected from the direct effect of corroding gases and the water becomes only slightly corrosive due to the short hold-up time.

Under these conditions little corrosion occurs. For the converse reasons considerable, often localised, corro-

sion occurs where only limited condensation occurs. Here the water in the seal pots is highly corrosive, often with a *p*H of only 4.

A third set of conditions exists where the gas may be up to 100% humidity but no condensation occurs, instead dampness is absorbed on a skin of chemicals deposited on the pipe wall. This can cause very aggressive corrosion.

A fourth condition often exists in high-pressure lines where owing to the continuous pressure reduction the gas is never saturated and no moisture deposition and little corrosion occurs.

Naturally these four zones are not clearly defined. Previously it was the practice to restrict the corrosion solely by removing corrosive constituents with moist gas. This entailed reducing the oxygen content to almost zero.

A further method to lessen internal corrosion is to dry the gas. This can be done by cooling, by means of hygroscopic fluids such as solutions of glycol or calcium chloride, or by means of absorbent solids such as silica gel.

Deep cooling of coal gas and later natural gas was originally used to reclaim hydro-carbons; a saturation temperature of +2 to +4°C. is normal.

In the case of drying with calcium chloride solution, the final dew point obtained is dependent on the temperature during drying, but normal experience indicates that approximately +10°C can be achieved.

Calcium chloride is precipitated rapidly by any ammonia and hydrogen cyanide in the gas. The latter reaction produces seriously corrosive products and hence the general experience with such plants has been poor.

It has been found that it is not necessary to dry the gas completely but that it is only necessary to maintain the relative humidity below 70% to stop corrosion completely.

Drying the gas produces certain disadvantages, which are mostly of a transient nature. Among them we may list the tendency for increased leakage from glands and other packing, the stiffening of leather bellows of meters, deposition of resins and the creation of dust. This latter results from the drying of old scale and rust which thus lose adherence.

Where drying is installed in an old system, the dust problem may for a time be serious and require filters to protect line equipment as well as increased attendance on seal pots, and cleaning traps. As a last resort careful dosing with drying oil to lay the dust has been used.

As can be seen only the somewhat expensive deep cooling method can maintain a low enough humidity to prevent corrosion under winter conditions, using the principle of drying: No protective coating has been found which will resist the action of the hydrocarbons. The final answer has not yet been found.—*H. Seebaum.—Das Gas und Wasserfach*, No. 11, March 17, 1961, **102**, 267.

50 mill. cu.ft. of natural gas daily by aluminium pipeline

By J. GRINDROD

DESIGNED to deliver 50 mill. cu.ft. of natural gas daily to the company's plant at Baton Rouge, Louisiana, U.S.A., a new above-ground aluminium pipeline has been installed by the Kaiser Aluminium and Chemical Company to replace a buried steel pipeline which had been found to be severely corroded.

The new line will carry natural gas from the Olin Gas Transmission Corporation and its construction in aluminium is expected to provide a number of advantages, including corrosion resistance in the above and below ground sections, increased gas flow because of its smooth interior surface, and reduction in weight without loss of strength.

The higher initial cost of aluminium is considerably offset by its lighter weight, ease of handling and the elimination of the need for painting. Aluminium also has the advantage of being non-sparking.

From the gas supply header to the pressure reducing station, a working pressure of 250 to 300 p.s.i.g. is maintained, but the 10-in. high-pressure pipeline was designed to withstand pressure surges to 500 p.s.i.g., and was hydrostatically tested to 750 p.s.i.g. for two hours immediately after the installation had been completed.

Overall, this gas delivery system uses over 1,600 ft. of seamless pipe ranging in diameter from 4-in. to 14-in. All the low- and high-pressure piping used was extruded from aluminium alloy 6061-T6.

The greater part of the line has been placed above ground because of the presence of complex underground installations and major plant streets.

Throughout the line standard weight I.P.S. seamless pipe has been installed. The 4-in. and 10-in. sections are of schedule 40 pipe, while the 12-in. and 14-in. sizes have a a wall thickness of .375 in.

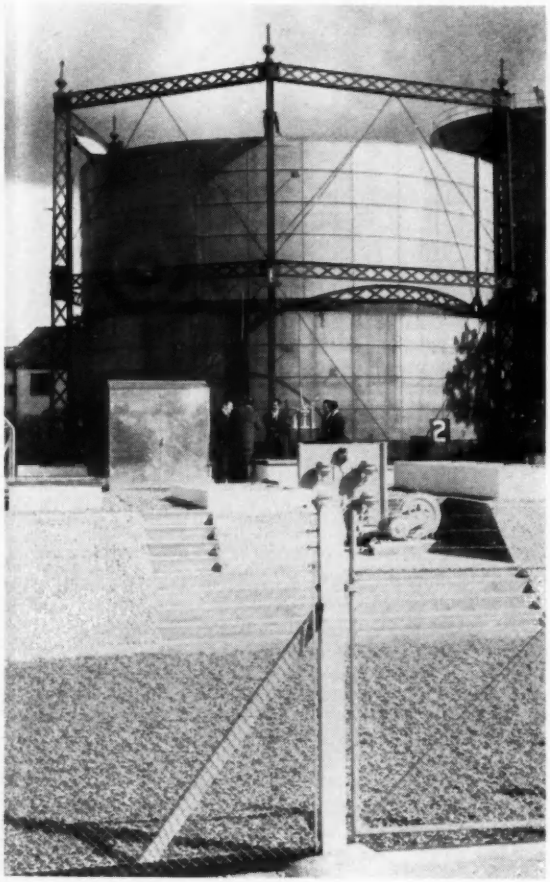
To avoid galvanic corrosion where aluminium and steel meet, at flanged connections, insulating kits consisting of a gasket, sleeves for all bolts and insulating washers at each end of the bolts are used.

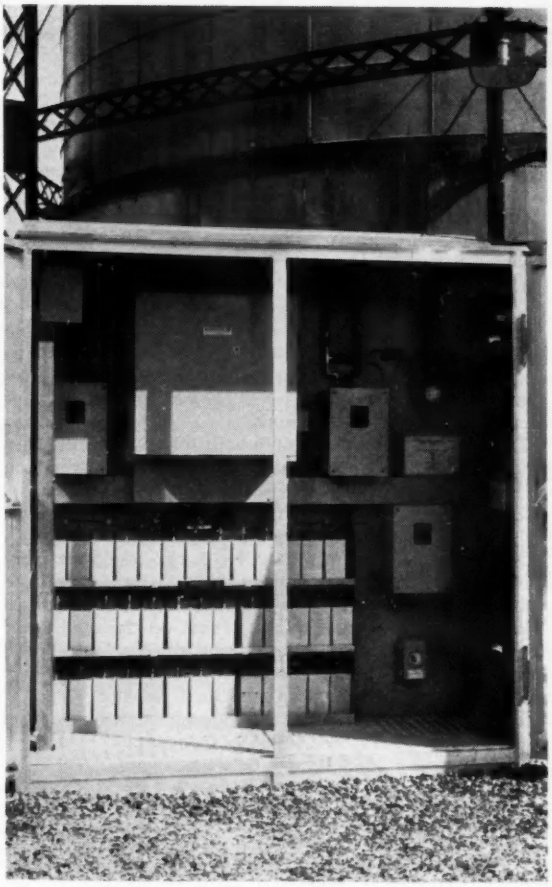
A portion of the gas company's dual metering system at the Kaiser Baton Rouge aluminium plant, showing the insulated flange at the aluminium-steel connection.

Because the system's pressure reducing station is adjacent to an office building, the high noise level common to this type of installation made noise suppression necessary and this was accomplished by the use of long radius fittings, valves designed to offer a minimum turbulence in the gas flow, silencers installed on the downstream side of the pressure reducing valves and sound-deadening foam glass insulation inside the station.

The sound level readings indicated nearly a 90% reduction in overall noise energy.

DATOFONIC CONTROL HOUSE





A general view of the 140,000 cu.ft. Edenbridge gasholder site, recently modernised by the South Eastern Gas Board. The centre unit housing in front of the gasholder (left picture) is for the Datofonic supervisory equipment and charts. The picture on the right clearly shows the simple construction of the new Datofonic supervisory equipment. The house is of metal construction with angle framework and alloy sheet cladding. Charts are housed in a similar compartment on the other side of the partition.

Modernising a 140,000 cu.ft. gasholder station

THE East Surrey Division of the South Eastern Gas Board has installed a Datofonic control house at their Edenbridge gasholder station, Kent, which is likely to set a trend in station supervision.

The entire installation is housed in a metal fabricated construction which overcomes the need for a special building. This 'house' consists of a simple framework of alloy angle to which is bolted a cladding of aluminium sheeting.

Full width double doors give access to the Datofonic installation on one side. A partition divides the structure in its length so that all charts and monitoring equipment can be housed in the other half without risk of explosion. The partition also forms a mounting board for the equipment.

The Datofonic installation is the Mark III type, providing comprehensive supervisory and partial control facilities, operating via the public telephone system.

There are two gasholders, with a total capacity of

140,000 cu.ft. Gas is received from the 10-in. diameter Whyteleafe to East Grinstead transmission main through a volumetric governor and holder control valves.

These are arranged to (i) cut off intake at high level; and (ii) cut off output from holders at low stock position.

Gas is distributed via a jet booster and automatically controlled station governors. An electrically driven booster is used as standby to the jet booster in the event of pressure failure in the transmission main.

This standby maintains adequate inlet pressure to the station and district governors.

A cut-off valve on the jet booster inlet prevents damage to the gasholders. A safety governor between the transmission and outlet mains from the station safeguards against failure of the station governors.

The Datofonic housing was specially designed to match the remaining station equipment. Edenbridge is a typical example of S.E.G.B. gasholder station modernisation. The whole site has a pleasing appearance with alloy covers to the independently housed equipment.

From the point of view of control, the Datofonic house indicates what can be done without erecting costly buildings. Temperature control in a housing with poor thermal efficiency is provided by a small heater erected at floor level in each side of the house.

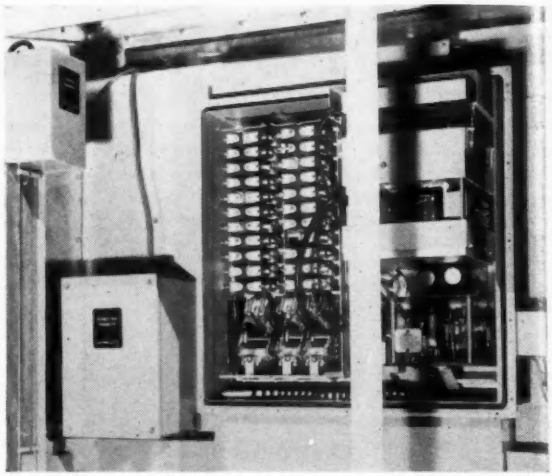
There is maximum access for Datofonic maintenance which is achieved simply by removing any plug-in section of the equipment for servicing. In the event of critical failure, this speeds the return to normal working since a replacement unit can be quickly plugged in.

Connection with Datofonic is by public telephone from East Croydon, which lies some 15 miles away, or can be obtained through any public telephone link.

Information is immediately available on the dialling of the station number on any aspect of the gasholder's operation.

Verbal messages are given for the following:—

(a) Stock in holder. The announcement series covers between 10,000 and 100,000 cu.ft.
(b) Gas flow over the range between 0 and 40,000 cu.ft. per minute.
(c) Grid pressure main, between the range of 1 and 20 p.s.i. with low pressure alarm.



Here is a close-up of the Datofonic relay rack showing the lid removed. The record playing unit is to the right of the relays. All units are independently plugged in for speedy replacement and servicing.

(d) Medium pressure main, between 6 in. and 18 in. w.g. A low pressure alarm is also fitted.
(e) District pressure, covering 4 in. to 12 in. w.g., with low pressure alarm.

In addition to these verbal messages, high and low alarms on the holder stock are given, and the equipment monitors the incoming electricity supply.

Failure of this supply causes Datofonic equipment to signal an alarm condition to an area sub-control room, and the equipment continues to operate on standby batteries in circuit with an automatic trickle charge unit.

Eight positions of the volumetric governor can be selected by an incoming dialled signal from the area sub-control room, which is also the receiving point for all alarm conditions.

Guarding against carbon monoxide poisoning

AMONG the hazards and dangers of day-to-day life there are many that occur in only a particular sphere, but there is one insidious killer that has a more universal field, and about which little is done in the way of prevention. This is carbon monoxide poisoning.

Carbon monoxide is tasteless, colourless, odourless and completely undetectable by the human senses, and has for long been recognised as a great source of danger in industry including gas, steel and iron foundries, heavy engineering, tunnelling and blasting.

In the home poisoning may result from faulty heating installations, leaking chimneys, gas and petrol lamps and even tobacco smoke.

Chronic CO poisoning, attributable to daily use of a faulty gas stove, constant inhalation of car exhaust fumes and other sources, affects the central nervous system and can lead to pronounced psychic changes of a permanent nature.

There exist awkward and in some cases elaborate apparatus for testing for CO, but these sometimes depend on moving currents and are useless in static air, or consist of a one time test prior to an operator entering a confined space.

All this has been altered by the recent invention of a detector by a Danish detective sergeant which consists of a small thin plastic plaque approximately 2 in. by 2 in. that can be worn on the coat lapel by a laboratory assistant, or worker in steelworks or gasworks, hung inside a moving car or cockpit, attached to the wall of a workshop or garage, and be as equally well used by the housewife in her kitchen as by the husband at his work.

This plaque contains a circular light yellow patch that turns black within minutes of being exposed to a carbon monoxide polluted atmosphere at well within the danger limit.

Obtainable from Herzbi Ltd., 57, Lordship Park, London, N.16, for the price of a packet of cigarettes, the man in the street can have a reliable safeguard against a sudden death. Each plaque will last him a month.

NEWS SUPPLEMENT

Cotswolds search for underground gas storage

TEXAS-STYLE drilling operations in miniature are being performed in the Cotswolds in an attempt to find underground layers of porous rock suitable for storing gas, reports the 'Birmingham Post.'

Some of the prospectors finished their work recently in a grazing field near the Over Norton road on the outskirts of Chipping Norton.

This exploration work, sponsored by the Gas Council, is being done in various parts of the country and has little in common with the haphazard methods of the early American oil-kings.

In its infancy

With the use of up-to-date derricks and drilling equipment, the work is superficially similar, but before a hole is drilled in the Cotswolds the lie of the land is studied carefully from the point of view of physical qualities and reactions of local inhabitants.

A spokesman for the Gas Council said that the scheme for storing gas in underground layers of porous rock was in its infancy.

If the tests being made are successful in finding suitable strata formations gas will be stored underground in summer and used in winter, when there is peak demand,' he said.

Two teams working

Two drilling teams are working in the Cotswolds, boring holes about 500 ft. deep to take readings which will decide whether the land is suitable for underground gas storage or not.

'If gas is stored in the Cotswolds, nothing will be seen where the holes are drilled, but a 3ft.-high stand-pipe in a small enclosed area about 10ft. square,' said Mr. L. O. Gay, the geologist in charge of the small drilling team.

He said it was unlikely that the Gas Council would know before next year whether the Cotswolds were suitable for gas storage.

'SPEED CHEAPER GAS PRODUCTION'

Select Committee makes thirteenth Board plea

SPEEDY reduction of gas production costs—of about 30%—a large enough scale to make an early effect on the average national price, is recommended in '*Report from the Select Committee on Nationalised Industries—the Gas Industry.*' (Stationery Office: 6s. 6d.). This, the report says, is necessary if gas is to hold its position as a fuel.

The Committee also considers that the present structure of the industry must be amended to include a thirteenth Board. It says: 'This new board would be able to offer a more positive lead to the industry in developing and undertaking large new projects, leading to cheaper gas.'

The Committee believes that the present structure of the industry is not suitable for developing and establishing large-scale production and distribution facilities.

FOR DISTRIBUTION

The new board would have power and responsibility for the generation of gas by large-scale processes and for its distribution. The Gas Council would be left with its present functions; the Committee did not favour giving the Council itself powers to manufacture and supply gas.

Time is seen as the predominant factor. The Committee foresees two dangers: First, that when new processes are approved the organisation will not be there to make the most of them. Second, that unless the organisation is changed the processes may not come forward as quickly as they should.

COMPETITION

The Committee feels that the key to success must lie in the ability of the gas industry to compete. It is felt that Gas Council Research expenditure is too low in relation to the industry's turnover.

The Committee says: 'Some area boards may still be able to get some important reduction in overall costs by adopting more processes that use oil; but the best chance of achieving a substantial reduction in cost in all the boards appears to lie in large-scale production on a nationalised basis, backed by a national grid and helped by underground storage.'

The Committee feels that investigation of the Lurgi process has suffered from 'a lack of drive' which a separate national authority would have given. The importation of methane project has been different. The North Thames Gas Board, acting for the Gas Council has been able to supply the necessary drive.

The Committee thinks that recent technological advances have brought the industry to a position not envisaged in the Gas Act 1948, emphasis of which was on the independence of area boards. Today the emphasis is technologically on their interdependence.

The Committee feels that large-scale Lurgi production possibilities, which will use coal as well as some imported enriching gas, should be looked at again as a matter of urgency.

Town centre redevelopment

THERE was a growing awareness last year on the part of local authorities of the need for, and the advantages to be gained from the redevelopment of central areas to meet modern requirements, says the annual report of the Ministry of Housing and Local Government.

In the north-west much thought is being given to projects designed to provide more attractive shopping centres, offices, markets and public buildings, and to improve traffic circulation.

There are at present before the Minister town centre proposals for Middleton, Poulton-le-Fylde, Blackburn, Oldham, Preston, and for a further stage at Burnley.

New contract for furnace precipitators

FIVE more precipitators for the Lackenby steel plant oxygen-blown open hearth steel furnaces will be supplied to Dorman Long Ltd. by Lodge-Cottrell Ltd.

This makes a total of six furnaces to be supplied with precipitators, at a contract value of approximately £440,000.

Plant for each furnace will consist of one four-stage horizontal-flow high-efficiency electrofilter, with all the necessary transformer rectifier equipment, ventilation fan, drag link conveyors, dust collecting and pelletising plant.

SITE SHOTBLASTING AT EXETER GASWORKS

The surface of a sulphuric acid tank at Exeter gasworks is prepared for repainting by the mobile site shotblasting service operated by R. J. Richardson and Sons Ltd., of Birmingham, one of the companies in the Staveley group. The plant, which is transported in two seven-ton trucks with trailers, includes shotblasting equipment made by another Staveley company, Tilghman's Ltd., of Altrincham.

DEARER GAS PROSPECT FOR BELFAST

THE annual report of the Belfast Corporation Gas Department, which has just been submitted to the Gas Committee, gives warning of a possible rise in tariffs. Mr. J. Dow, Engineer and Manager, said that during the year ended March 31, 1961, there was a net deficit of £32,209, and expenditure for the next year was expected to increase by £100,000.

Revenue from gas was expected to increase by £90,000 as a result of the last price increase, and coke sales should provide an additional £10,000. Revenue from street lighting would be further reduced by £20,000 because of the policy of changing over to electricity, but this should be offset by the sale of gas to Lisburn.

'Given a normal year,' says Mr. Dow, 'it would appear that our income and expenditure should break even, but it is also possible with the present unstable employment position that unfavourable trading conditions in the city could arise which would necessitate a further withdrawal from our reserves or a rise in gas tariffs.'

Mr. Dow said that the year under review had produced a sharp fall in gross profit, and he viewed with apprehension the rising cost of coal, increases in salaries, wages and miscellaneous charges. Coal was expected to cost an additional £10,000 this year; wages might be up by £50,000; salaries by £10,000, and National Health Insurance and superannuation contributions by £4,000. In addition the graduated pension scheme introduced on April 1, 1961, was expected to incur an additional £6,000, and repayment of debt charges and interest might be up by as much as £20,000.

Mr. Dow said that with the Belfast Corporation (General Powers) Bill, 1961, likely to be approved by Parliament this would facilitate a review of the present methods of gas charges, and he would recommend that tariffs remain unchanged meantime.

'The result of the year's trading, although disappointing, was not unexpected,' he said, 'as it was anticipated that the past year would be a difficult one. The net deficit is brought about primarily by a reduction in the gross profit on the revenue account of £109,871 compared with the previous year, as a result of the expenditure having risen by £59,274 and a fall in revenue of £50,597.'

East Midlands coke ovens to close

THE Harworth coke ovens of the East Midlands Division of the National Coal Board, which produce 3,200 tons of domestic and industrial coke a week, are to be closed. This was announced by the Board after a meeting attended by Board and union representatives, says a report in *The Guardian*.

The reason given for the closure is the continuing difficulty throughout the country in disposing of the present output of coke and the high level of stockpiling. The stock at Harworth is about 200,000 tons.

A Coal Board spokesman said: 'We have three plants in the East Midlands area and it is not economic to keep them all running.' Harworth's 25-year-old ovens would have required renewal in the next few years.

The plant will be closed in stages, and the final date will probably be in the autumn. There will be no redundancy.

80 WOULD-BE TRAINEES

The Scottish Gas Board has received 80 applications for 20 places on the pre-apprenticeship training course for gasfitters, which will be held in Edinburgh from October to June.

The course is for boys of 15 intending to start their apprenticeship at 16.

New showspace for North East

THE North Eastern Gas Board will transfer showrooms in Market Buildings, Vicar-lane, Leeds, to more extensive accommodation in a new seven-storey building now being erected in Eastgate.

This is expected to be ready by November.

Popular plant

The Lurgi gasification plant at Westfield, Fife, has become so popular for conducted tours that bookings are being received for March and April of next year.

A wedding gift of an Electrolux gas operated model L.40 refrigerator has been presented by the directors of the company to the Duke and Duchess of Kent, and is now installed at their home, The Coppins, Iver, Bucks.

Five awards for gas editors

Receiving congratulations from fellow gas board editors on his double success in the 1961 National House Journal Competition is Southern Gas Board editor, Mr. Frank Wiles, shown second from right. Others are Mr. Gordon Davies of Wales Gas Board's Nwy News; *Miss Ann Bradbury, of North Western Gas Board's* Link Up; *and the chairman of the British Association of Industrial Editors, Mr. E. H. Dodimead of North Thames Gas Board's* Thames Gas Magazine, *which received an award of merit.*

NO fewer than five awards went to editors of gas board magazines in this year's National House Journal Competition. Organised by the British Association of Industrial Editors, it attracted a record entry of well over 400 magazines and newspapers published by industry and the public services.

Notable was the success achieved by Mr. Frank Wiles, editor of Southern Gas Board's staff quarterly *Flame* and their sales and service newspaper *Southern Service;* he won awards of excellence for both, since they were each judged best in their respective classes.

Certificates of merit

Certificates of merit for high quality of content and presentation went to Mr. E. H. Dodimead of North Thames Gas Board's *Thames Gas Magazine,* which was also finalist for the House Story of the Year trophy, a major award in the competition; Mr. A. A. Clark of Eastern Gas Board's *E. G. News* (this was the fourth year in succession that he won a similar award); and Mr. J. O. Butler, of East Midlands Gas Board's *Emgas.*

Presentations of the certificates were made by Lord Crook, President of the British Association of Industrial Editors, at the annual convention at Southport.

Steady progress with Coleshill Lurgi plant

WORK on the new Lurgi high pressure coal gasification plant now being built for the West Midlands Gas Board at Coleshill, Birmingham, has progressed steadily since clearance of the 50-acre virgin site began last autumn.

With the considerable preliminary preparations, including drainage and the diversion of a natural stream, road construction and rail siding formation, now well in hand, the focal point of interest just recently has been the laying of the reinforced concrete foundations for the gasifier house, which is to accommodate the five Lurgi generators.

One operation

About 132 tons of reinforcement were used, and the actual pouring of the concrete, 746 cu.yds. was carried out by crane and skip in one continuous operation in a 24-hour period.

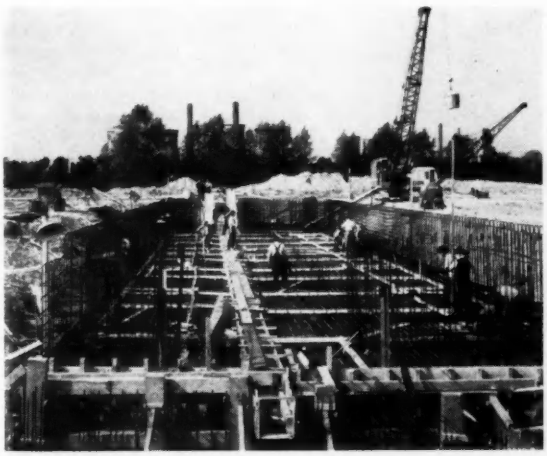
Two cranes, with 45 ft. jibs and ½ cu.yd. skips were employed on this marathon task.

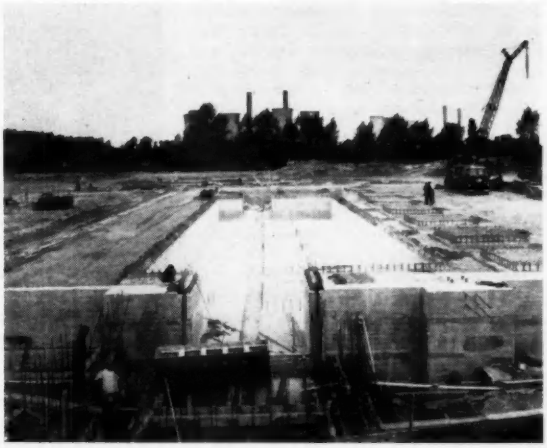
A suspended floor slab will be placed over the foundations after the erection of the 25-ton portal frames carrying the main structure of the house.

The Coleshill plant will have an initial production capacity of 40 mill. cu.ft. of gas per day. Main contractors for the Lurgi and ancillary plants are Woodall-Duckham of London.

The pictures show the progress made in 24 hours—before and after the concrete was poured.

24-HOURS' PROGRESS: *Before and after concrete pouring at the Coleshill Lurgi gasification plant.*





New NCB plan for coal central heating service

A PLAN to provide hot-water heating for every housewife, including the necessary finance, which the Chairman of the National Coal Board, Lord Robens, has described as a 'major change in policy,' has been announced.

Lord Robens said at Thorncliffe, near Sheffield, that the board would be able in the autumn or spring to put on the market an appliance for the partial central heating of a three-bedroomed house, based on the old open fire and using little extra fuel, says the Sheffield correspondent of *The Guardian*.

He added that this type of house normally used 2 cwt. of fuel a week, and for 2½ cwt. there would be partial central heating, including two or three radiators and a towel rail.

It would be a simple operation on the part of the housewife. The plant was fully automatic and would fit into the kitchen as neatly as a washing machine.

The board intended to open its own showrooms; others would be owned by the Coal Utilisation Council, others by large merchants, and some jointly by the board and small merchants.

Lord Robens said: 'We shall be able to send a technical man along who can advise the housewife on the right kind of appliance and make a complete "package" deal with the N.C.B. including installation, providing finance for it under the board's House Warming Plan, and make proper arrangements for the right smokeless fuel to be guaranteed to her.

'We aim to marry the commercial interests of every one concerned with the social requirements of the consumer.

'We shall be providing a service of convenience and added comfort with a minimum of trouble. Millions of homes in this country can be converted easily.

'We aim to do this at 15s. a week over a period of five years, and then the whole thing is paid up and the fuel will be supplied by the merchants in the ordinary way.'

Lord Robens described the plan as a new and enterprising approach to the marketing of solid fuel, and added that the Chancellor's economic plan would not affect the scheme.

'Alter site of gasworks' suggestion

A SUGGESTION that the Jersey Gas Light Company's gas-making works should be moved from the present site in the centre of St. Helier to another smaller site is one of the proposals contained in a 59-page report 'Island of Jersey Development Plan' shortly to be presented to the island's government, the Jersey States.

The report says that the present siting of the gasworks is most unfortunate and restricts the use of land around it to workshops, builders' yards and similar purposes, unless changes were made in the method of gas production.

Although the present plant is fairly new, the report says, it will need replacing in less than 20 years. It recommends opening discussions immediately with the gas company with a view to finding alternative sites.

'By changing the method of production,' the report states, 're-location of the plant and perhaps even of the holders would be possible on a new site a fraction the size of the present one, thus releasing eight or nine acres in the heart of the town for more suitable uses.'

This would increase the value of the land and make development worthwhile.

The report, which is an interim one, has been prepared by Mr. William Barrett, and covers almost every aspect of island life. The second part, containing full development plans for the island, is expected to be ready in about two months' time.

New catalytic reforming plant

THE West Midlands Gas Board has awarded to Humphreys & Glasgow Ltd. a further contract for the installation of Onia-Gegi cyclic catalytic reforming plant. The plant will comprise two sections and have a total productive capacity of 8 mill. cu.ft. per day of 475 B.t.u. gas.

The feedstock is to be light distillate, with the alternative of mine gas for heating and in each case wide variations in quality can be accepted.

The contract includes control buildings and machinery rooms, relief holder and ancillary equipment, such as mine gas compressors, exhausters, naphthalene washers, and water cooling system. It is to be completed ready for the winter load of 1962 and the value of this contract will be about £300,000.

The Coal Preparation and Mining Division of Simon-Carves Ltd. is being transferred to Carlisle, and after December 31, 1961, its address will be: Simon-Carves Ltd., P.O. Box No. 26, Durranhill, Carlisle. This move is being made to concentrate the activities of Simon Engineering in coal preparation and mining work.

LONG SERVICE CERTIFICATE

Mr. L. P. Ingram, who retired recently from the position of chief engineer of the South Western Gas Board, has received a long service certificate and award from the Board. He is seen here (right of the picture) being presented with his certificate for 40 years' service by the Board Chairman, Mr. C. H. Chester. The presentation took place at a Cheltenham luncheon at the end of July, when tribute was paid to Mr. Ingram by Mr. Chester and two part-time members of the Board, Mr. Laurence Easterbrook and Ald. H. E. Wright. At a previous ceremony at Bath Mr. Chester presented Mr. Ingram with a writing desk from senior colleagues.

NALGO will disregard a 'wage pause'

THE National and Local Government Officers' Association has announced that it intends to disregard the Chancellor of the Exchequer's 'wage pause' and to submit claims this autumn for completely new salary structures for all its 274,000 members.

This will mean demands for more pay for administrative and clerical staff employed by the local authorities, and for similar grades in electricity supply, gas, water, port authorities, provincial bus companies, river and catchment boards and the National Health Service, says the Labour Correspondent of *The Financial Times*.

The Directors of the Imperial Continental Gas Association have recommended the payment of a final dividend of 8% less tax. This, with a 4% interim dividend, gives a total ordinary dividend for the year of 12% less tax. From a total available for appropriation of £1,083,009, this leaves a balance to be carried forward of £259,809.

CORRESPONDENCE

B.G.S.A. and pay

Dear Sir,

May I use your columns to express the grave concern of this Association that the Government appears to have shown unfair discrimination against public employees in its refusal to sanction salary increases in the sectors of employment over which it has direct control, even if such increases have been agreed by the negotiating parties or at arbitration.

The Government has, in the past, denied any direct control over the negotiations in the nationalised industries, and quite recently Mr. J. C. George, Parliamentary Secretary to the Ministry of Power, speaking in the House about certain conditions of employment in the coal industry, said: 'These things are not within the Minister's province and . . . they are far better left to the two sides of the industry to negotiate, as they always have negotiated them and as I hope they always will negotiate them.'

Gas staffs would deplore any attempt now by the Government to control or limit the negotiation of their terms and conditions of employment through the machinery established under the Gas Act, or at arbitration, and it is to be hoped that the Gas Council and Area Boards have not, in fact, received any directions or guidance from the Minister in this connection.

The salary levels in the gas industry are, even now, well below those of staff employees in many other industries, as was shown in the recent survey by the Ministry of Labour and National Service. The B.G.S.A. will expect to be able to negotiate freely, through the National and Area Joint Councils, salary scales and conditions of service which will be attractive to the best available potential staff and which will maintain enthusiasm within the industry.

The B.G.S.A. therefore joins with a number of other 'white collar' unions in protesting against any discrimination against employees in the public service.

Yours faithfully,

F. C. HENFREY-SMITH,
General Secretary.

The British Gas Staff Association,
34, Gloucester Gardens,
Bishop's Bridge Road,
London, W.2.

PERSONAL NOTES

MR. C. A. MACLEOD retired at the end of June after over 41 years' service with R. & A. Main Ltd. He had been sales director since 1952 after appointment to the Board of Directors in March, 1951. Mr. Macleod joined R. & A. Main in January 1920, and represented them in the Eastern Counties, South-East England and parts of the London Area until 1939. During the war he was the Company's representative for war work and was appointed to the executive staff in 1945. In 1949 he succeeded MR. H. F. POTTER as southern sales manager. MR. S. A. KING has now joined the Board of R. & A. Main as Sales Director. He was already well-known as commercial manager of the Eastern Gas Board prior to joining R. & A. Main in 1957.

MR. A. H. DAVIES has been appointed Marketing Manager to Powell Duffryn Heating Ltd., the newest member of the Powell Duffryn Group, controlling marketing planning and all publicity activities. MR. L. ROBINSON becomes General Manager of the Janitor Works, Camberley. He was previously with Powell Duffryn Technical Services Ltd., as group production engineer. MR. J. MORTON becomes Sales Promotion and Training Officer. MR. F. J. MCCANN has been appointed Publicity Officer, in charge of all advertising and print buying.

MR. F. SALTER, Manager at Staines and District Manager at Chertsey, retires this month from the service of the North Thames Gas Board after 46 years. Colleagues subscribed to buy him a camera, and this was presented to him on their behalf by MR. D. H. ROUSE, Western Divisional Manager. In addition to his own 46 years' service, Mr. Salter's family have associations with the gas industry in Staines, the family total of service amounting to 213 years. His father and uncle completed 44 years, a cousin 40 years, while Mr. Salter's younger brother carries on the tradition —he works for North Thames Gas at Staines, and so far has 39 years' service to his credit.

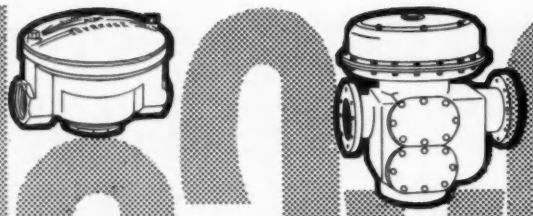
MR. H. A. LONGDEN, Chairman of the West Midlands Division, National Coal Board, leaves the services of the Board at the end of September after a lifetime's work in the British coal industry to take up the post of Deputy Chairman and Chief Executive of the Cementation Company Ltd.

MR. W. S. SINCLAIR has been appointed by the Incandescent Group to be Manager of its Cardiff office, as from the beginning of August. Mr. Sinclair, who has 12 years' service with the company, is already well-known in the South Wales area.

Grimsby Town Council has approved a Housing Committee recommendation that gas refrigerators should be made available to all council house tenants requiring them, on payment of 2s. a week.

OBITUARY

DR. W. A. MACFARLANE, C.B.E., managing director of the National Industrial Fuel Efficiency Service and president of the Institute of Fuel, has died at the age of 53, states *The Times*. He was a King's Scholar at Westminster School, and went up to Oxford in 1926 with an Open Scholarship in Natural Sciences at Balliol College where he was a pupil of Sir Harold Hartley. In 1934 he was appointed a junior scientific officer at the Fuel Research Station, Greenwich. On the formation of the Ministry of Fuel and Power in 1941 he was appointed as director of Fuel Efficiency, continuing as such until 1948, when he went to the United States as director of the United Kingdom Scientific Mission and attaché for Scientific Questions, British Embassy, Washington. Mr. Macfarlane was elected a member of the institute in 1943, a Fellow in 1951, was a vice-president from 1955 to 1958, and was a member of the Publications Committee. He had served continuously on the council since 1947, and became president in October, 1960. He was made C.B.E. in 1958.



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